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| **Improving Sustainability and Reducing Environmental Impacts by Beneficially Reusing Hydraulic Fracturing Produced Water in Non-Food Agriculture** |
| Sponsor | PVAMU PRISE Grant |
| Investigators | Raghava Kommalapati with Chellam (TAMU PI) |
| Project Dates | 06/2023-05/2024 |
| Amount Awarded | $40,000 (PV Budget $20,000) |
| Project Description: |
| Worsening water scarcity facing dryland agriculture necessitates alternate sources such as produced water from unconventional oil and gas operations. Importantly, the extreme toxicity of hydraulic fracturing wastewater arising from myriad chemical additives employed during oil and gas exploration and production dictates a high level of treatment before it can be potentially reused. In this research, we propose to develop a robust and innovative coagulation-flocculation-clarification-desalination treatment train to purify highly impaired produced water to allow its beneficial reuse in non-food agriculture. Our research is designed to demonstrate the technical and economic feasibility of a unique water purification methodology including thermal desalination (humidification-dehumidification, HdH). TAMU and PVAMU, in collaboration with industrial partners will (i) obtain and characterize produced water samples, (ii) perform pretreatment with polymer-assisted coagulation and high-rate clarification, and (iii) thermally desalinate the clean brine. Bench-scale experiments have been designed to evaluate rheological properties of highly saline water, scientific mechanisms associated with colloid destabilization and transport, and interfacial phenomena underlying polymer coiling and adsorption in brines. Funds will be predominantly used to support graduate students who will generate preliminary data for inclusion in follow-up proposals to federal agencies such as the Department of Energy and/or National Science Foundation. |